

Enriched Isotopic Composition of the NW Central American Volcanic Arc: Crustal Contamination or a Sediment Slab Melt?

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New Sr-Nd-Pb isotope data on samples from mafic volcanic centers along and behind the volcanic front in Guatemala, El Salvador and Honduras further constrain the source components for the Central American Volcanic Arc (CAVA). The subduction input (consisting of subducting sediments, seawater altered and unaltered igneous crust and serpentinites), mantle wedge and overlying lithosphere (crust and mantle) influence the composition of the erupted arc volcanic rocks.

Samples from Guatemala and Honduras show negative correlation of Sr and Nd isotope ratios, whereas data from El Salvador varies significantly in $^{143}\text{Nd}/^{144}\text{Nd}$ (0.513001 to 0.512868) with little variation in $^{87}\text{Sr}/^{86}\text{Sr}$ (0.70361 to 0.70387). When compared with isotope data from the Nicaraguan volcanic front (VF), El Salvador, Guatemala and Honduras volcanics extend to much less radiogenic Nd with behind the volcanic front (BVF) samples having the least radiogenic Nd isotopic compositions. Neodymium isotope ratios correlate negatively with La/Sm and La/Yb ratios. Lead isotope data for all samples form overlapping slightly positive arrays with the BVF samples from a given arc segment being generally more radiogenic than samples from the VF.

Back arc samples from Honduras have the most mid-ocean-ridge basalt (MORB)-like compositions and are believed to represent the composition of the mantle wedge. Samples from the Nicaraguan VF have similar Nd but higher Sr isotope compositions most likely reflecting enrichment with slab fluids containing subducted sediment or seawater Sr. Samples from BVF in El Salvador, Guatemala and Honduras define a third endmember with the least radiogenic Nd, most radiogenic Sr and Pb isotopic compositions, and highest La/Sm and La/Yb ratios most likely containing a sediment melt component from the underlying continental crust or subducted sediments.